

REMARKS

In the Office Action, the Examiner stated that she would object to claims 41-48 if claims 33-40 are found allowable; rejected claims 21-32 under 35 U.S.C. § 112, second paragraph, as being indefinite; rejected claims 1 and 21 under 35 U.S.C. § 102(b) as anticipated by U.S. Patent Application Publication No. US 2001/0018168 of Kosa; rejected claims 1, 3-5, 7, 21, 23-25 and 27 under Section 102(b) as anticipated by U.S. Patent No. 6,372,413 of Ema; rejected claims 21, 33, and 41 under Section 102(e) as anticipated by U.S. Patent No. 6,818,387 of Takahashi; rejected claims 1, 2, 21, and 22 under Section 102(e) as anticipated by U.S. Patent Application Publication No. US 2004/0029026 of Hayasaki; rejected claims 8 and 28 under 35 U.S.C. § 103(a) as being unpatentable over Kosa or Ema or Hayasaki; rejected claims 28, 40, and 48 under Section 103(a) as being obvious over Takahashi; rejected claims 9-18 and 29-32 under Section 103(a) as being unpatentable over Kosa or Ema or Hayasaki in view of U.S. Patent Application Publication No. US2003/0219660 of Ito; rejected claim 6 under Section 103(a) as being unpatentable over Ema in view of U.S. Patent Application Publication No. US 2005/0176259 of Yokoi; rejected claims 19 and 20 under Section 103(a) as being unpatentable over Kosa or Ema or Hayasaki in view of U.S. Patent No. 6,358,673 of Namatsu; rejected claims 34 and 42 under Section 103(a) as being unpatentable over Takahashi in view of Hayasaki; and rejected claims 35-39 and 43-47 under Section 103(a) as being unpatentable over Takahashi in view of Ema.

Applicants have amended claims 3, 5, 8, 9, 11, 12, 16-20, 23, 25, 28-30, 35, 37, 40, 43, 45, and 48 to more appropriately define the invention and to improve form. Applicants have also canceled claims 1, 2, 21, 22, 33, 34, 41, and 42. Further, Applicants have added new claims 132 and 133 to cover additional features of their

invention. As a result, claims 3-20, 23-32, 35-40, and 42-133 remain pending with claims 49-131 withdrawn from consideration.

Applicants acknowledge the Examiner's statement that she will object to claims 41-48 if claims 33-40 are found to be allowable.

With regard to the Examiner's rejection of claims 21-32 under 35 U.S.C. § 112, second paragraph, as being indefinite, the rejection is moot with respect to canceled claims 21 and 22. Proper antecedent basis is provided for the elements of claims 23-32 which, Applicants submit, meet the requirements of Section 112, second paragraph. Applicants therefore request that the Examiner reconsider and withdraw this rejection.

Applicants traverse the Examiner's rejection of claims 1 and 21 under Section 102(b) as anticipated by Kosa. This rejection has been rendered moot by the cancellation of claims 1 and 21. Applicants therefore request that the Examiner withdraw this rejection.

Applicants traverse the Examiner's rejection of claims 1, 3-5, 7, 21, 23-25 and 27 under Section 102(b) as anticipated by Ema. This rejection is moot with respect to canceled claims 1 and 21. Ema fails to anticipate any of independent claims 3, 5, 23, and 25 because Ema fails to disclose each and every element of any of these claims. In particular, independent claims 3 and 5 each require slimming to remove a surface layer of a pattern, and claims independent 23 and 25 each require removing a surface layer of a pattern. Ema fails to disclose any such steps. While it appears Ema discloses a substrate process method capable of reducing defects that may occur after a developing process, Ema does not disclose changing a size of a pattern. Instead, Ema only discloses use of deionized water 17 containing ozone gas in a rinsing process

to decompose resist residues 14A into small pieces of resist residue 14B and remove them from substrate 11. (Col. 3, lines 44-62.) Since Ema fails to disclose each and every element of any of independent claims 3, 5, 23 and 25, these claims as well as claims 4, 7, 24, and 27 that respectively depend therefrom, are allowable over Ema. Applicants therefore request that the Examiner withdraw the rejection under Section 102(b) based on Ema.

Applicants traverse the Examiner's rejection of claims 21, 33, and 41, under Section 102(e) as anticipated by Takahashi. This rejection has been rendered moot by the cancellation of claims 21, 33, and 41. Applicants therefore request that the Examiner withdraw this rejection.

Applicants traverse the Examiner's rejection of claims 1, 2, 21, and 22 under Section 102(e) as anticipated by Hayasaki. This rejection has been rendered moot by the cancellation of claims 1, 2, 21, and 22. Applicants therefore request that the Examiner withdraw this rejection.

Applicants traverse the Examiner's rejection of claims 8 and 28 under Section 103(a) as unpatentable over Kosa or Ema or Hayasaki.

Kosa discloses a resist development method illustrated by a flow chart in Fig. 1 and described in paragraph 0019. The flow chart shows step S1 of applying a resist film to a semiconductor substrate and exposing the film to a prescribed pattern. In step S2, the exposed part of the resist film is removed by immersion in a developer liquid. In step S3, ozone water is dropped onto the developed pattern "to clean the resist film pattern." In step S4, the wafer is rotated to remove the developer, dissolved resist, and their mixture from the substrate. Thus, Kosa fails to disclose or suggest slimming to

remove a surface layer of a pattern by causing the pattern to contact with an activated water, as required by Applicants' independent claim 5 from which claim 8 depends. Instead, Kosa only discloses using water to clean the resist film pattern which, contrary to the Examiner's position, is different from slimming to remove a surface layer. Further, Kosa fails to disclose or suggest producing radicals in the activated water by irradiating the water with light, as also required by claim 5 from which claim 8 depends. Therefore, claim 8 is allowable over Kosa.

Claim 28 is also allowable over Kosa because Kosa fails to disclose or suggest exposing a photosensitive resin film, reforming a surface layer of a pattern by causing the pattern to contact with an activated water, and removing the surface layer of the pattern by supplying a developing solution to the pattern, as required by claim 25 from which claim 28 depends. Again, as explained above, Kosa only discloses use of ozone water to clean a resist film pattern. Therefore, claim 28 is allowable over Kosa.

Claims 8 and 28 are allowable over Ema because they respectively depend from claims 5 and 25 which are also allowable over Ema for the reasons previously set forth in response to rejection under Section 102(b) over Ema.

With regard to the rejection over Hayasaki, Applicants assert that Hayasaki is not prior art to the present application under 35 U.S.C. § 103(c).

Pursuant to 35 U.S.C. 103(c):

Subject matter developed by another person, which qualifies as prior art only under one or more of subsections (e), (f), and (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at time the invention was made, owned by the same person or subject of an obligation of assignment to the same person.

Based on the U.S. filing date and publication date of Hayasaki, Hayasaki only qualifies as prior art under 35 U.S.C. § 102(e). Further, the Examiner is applying Hayasaki in an obviousness rejection under Section 103(a). Finally, Applicants state that the present application and Hayasaki were, at the time the present invention was made was, owned by Kabushiki Kaisha Toshiba. Thus, all the requirements of Section 103(c) are met and establish that Hayasaki can not constitute prior art.

Applicants traverse the Examiner's rejection of claims 28, 40, and 48 under Section 103(a) as unpatentable over Takahashi. Independent claim 25, from which claim 28 depends, is directed to a pattern forming method including reforming a surface layer of a pattern by causing the pattern to contact with an activated water; and removing the surface layer of the pattern by supplying a developing solution to the pattern, wherein the activated water contains radicals produced by irradiating the water in which molecules of gas are dissolved, with light.

Takahashi discloses a method of forming a pattern including coating a photosensitive resist film on a surface of a substrate; subjecting the resist film to an exposure process; coating an oxidizing liquid having an oxidative effect on a surface of the film that has been subjected to an exposure process to cause the surface of the resist film to oxidize; feeding a developing solution to the resist film whose surface has been oxidized to perform a development of the resist film; and feeding a rinsing solution to the substrate surface to wash the substrate. (Abstract and Col. 2, lines 15-33). Further, it appears that Takahashi uses an ozone water as the oxidizing liquid. Thus,

while Takahashi discloses coating a surface of a photosensitive resist film with an ozone water, Takahashi does not disclose any method for generating the ozone water and, therefore, fails to disclose or suggest Applicants' claimed combination as recited in claim 25 including "reforming a surface layer of a pattern by causing the pattern to contact with an activated water; . . . wherein the activated water contains radicals produced by irradiating the water in which molecules of gas are dissolved, with light. Therefore, claims 25 and 28, which depend therefrom, are allowable over Takahashi.

Claim 40 depends from claim 35 which requires a "slimming a surface layer of the photosensitive resin film by causing the photosensitive resin film to contact with an activated water containing radicals of atoms or molecules produced by irradiating the water with light." Takahashi at least fails to disclose such a slimming process and the production of activated water by irradiating the water with light as required by claim 35. Therefore, claim 40 is allowable over Takahashi at least due to its dependence from claim 35.

Claim 48 depends from claim 43 which recites limitations similar to those discussed above regarding claims 40. Therefore, claim 48 is allowable over Takahashi at least due to its dependence from claim 43.

Applicants traverse the Examiner's rejection of claims 9-18 and 29-32 under Section 103(a) as unpatentable over Kosa or Ema or Hayasaki and Ito. The disclosure of Kosa was discussed above. In view of that discussion, it is clear that Kosa fails to disclose or suggest a pattern forming method comprising a combination including "slimming to remove a surface layer of the pattern by causing the pattern to contact with an activated water, as required by independent claim 3." Instead, Kosa only discloses

using ozone water to clean the resist film pattern, which is different from slimming to remove a surface layer. Further, Kosa fails to disclose or suggest producing radicals in the activated water by irradiating the water with light, as also required by claim 3. Therefore, claims 9-18 are patentable over Kosa at least due to their dependence on claim 3.

Kosa fails to disclose or suggest all the limitations of claim 23 from which claims 29-32 depend. In particular, claim 23 is directed to a pattern forming method comprising "reforming a surface layer of a pattern of the photosensitive resin film by causing the pattern to contact with an activated water; and removing the surface layer of the pattern by supplying a developing solution to the pattern, wherein the activated water contains radicals of atoms or molecules produced by irradiating the water with light." As discussed above, Kosa only discloses using ozone water to clean the resist film pattern, which is not the same as removing a surface layer of the pattern. Further, Kosa fails to disclose or suggest producing radicals in the activated water by irradiating the water with light, as also required by claim 23. Therefore, claims 29-32 are patentable over Kosa at least due to their dependence on claim 23.

Ito fails to overcome the deficiencies of Kosa. Ito discloses a pattern forming method that appears to include slimming. However, Ito fails to disclose or suggest any use of activated water. Therefore, claims 9-18 and 29-32 are patentable over Kosa and Ito.

Claims 9-18 and 29-32 are patentable over Ema and Ito. As described above, Ema fails to disclose or suggest all elements of claims 3 and 23 from which claims 9-18 and 29-32 respectively depend. In view of the disclosure of Ito explained above, Ito fails

to overcome the deficiencies of Ema. At very least, Ito fails to disclose any use of activated water. Therefore, claims 9-18 and 29-32 are patentable over Ema and Ito.

The rejection of claims 9-18 and 29-32 as unpatentable over Hayasaki and Ito has been rendered moot by the removal of Hayasaki as prior art pursuant to Section 103(c).

Applicants traverse the Examiner's rejection of claim 6 under Section 103(a) as unpatentable over Ema and Yokoi. Ema fails to disclose or suggest all the features of claim 5 from which claim 6 depends, as discussed above. Yokoi appears to disclose contacting a substrate with ozone water to decompose a photoresist pattern. However, Yokoi fails to overcome the deficiencies of Ema, at least because Yokoi fails to disclose or suggest slimming to remove a surface layer of a pattern, as required by claim 5. Therefore, claim 6 is patentable over Ema and Yokoi.

Applicants traverse the rejection of claims 19 and 20 under Section 103(a) as unpatentable over Kosa or Ema or Hayasaki and Namatsu. As explained above, Kosa fails to disclose or suggest all the elements of claim 3 from which claims 19 and 20 depend. Namatsu is directed to using a supercritical fluid such as supercritical carbon dioxide, to dry resist patterns. Therefore, Namatsu fails to overcome the deficiencies of Kosa. Therefore, claim 19 and 20 are patentable over Kosa and Namatsu at least due to their dependence from claim 3.

Claims 19 and 20 are patentable over Ema at least because Ema fails to disclose or suggest all the features of claim 3, as discussed above. Again, in view of the disclosure of Namatsu as explained above, Namatsu fails to overcome the deficiencies

of Ema. Therefore, claims 19 and 20 are patentable over Ema and Namatsu at least due to their dependence from claim 3.

The rejection of claims 19 and 20 as unpatentable over Hayasaki and Namatsu has been rendered moot by the removal of Hayasaki as prior art pursuant to Section 103(c).

Applicants traverse the Examiner's rejection of claims 34 and 42 under Section 103(a) as unpatentable over Takahashi and Hayasaki. This rejection has been rendered moot by the cancellation of claims 34 and 42. Applicants therefore request that the Examiner withdraw this rejection.

Applicants traverse the Examiner's rejection of claims 35-39 and 43-47 under Section 103(a) as unpatentable over Takahashi and Ema. Applicants previously explained why Takahashi fails to disclose or suggest all the features of claim 35 from which claims 36-39 depend and claim 43 from which claim 44 depends. Further, independent claim 45 recites features similar to those of claim 43, so that Takahashi fails to disclose or suggest all the features of claim 45 and claims 46 and 47 that depend from claim 45. Ema fails to overcome the deficiencies of Takahashi. In view of the disclosure of Ema explained above, Ema fails to disclose or suggest a pattern forming method including "slimming a surface layer of [a] photosensitive resin film by causing the photosensitive resin film to contact with an activated water containing radicals of atoms or molecules produced by irradiating the water with light," as required by independent claim 35. Independent claims 43 and 45 recite similar limitations, therefore, Ema fails to overcome the deficiencies of Takahashi with respect of all of

these claims. Therefore, claims 35-39 and 43-47 are patentable over Takahashi and Ema.

In view of the foregoing amendments and remarks, Applicants respectfully request reconsideration and reexamination of this application and the timely allowance of the pending claims.

Please grant any extensions of time required to enter this response and charge any additional required fees to our Deposit Account No. 06-0916.

Respectfully submitted,

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